Soil Conservation

February 1978

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From the Administrator

Strengthening the Partnership

The Soil and Water Resources Conservation Act of 1977 will attune SCS programs more closely to the Nation's conservation needs, help conservation districts make their local programs more effective, and give more citizens a chance to share their ideas.

The new law (see page 23) calls for SCS, in cooperation with districts and State agencies, to take a comprehensive look at our soil and water resources. This appraisal will provide information on the condition and quantity of resources in each county. Districts can use the information to pinpoint their most critical needs and set priorities for action.

SCS will continue to monitor these resources. We can compare data collected over the years with our base information to see how effective ongoing conservation programs are and what new approaches may be needed.

Districts can use the same process to determine whether local efforts are meeting their goals. Working through State agencies and the National Association of Conservation Districts (NACD), they also will have a hand in developing the 5-year national conservation program specified in the law. A committee of district and NACD people already is helping us plan how to implement the law.

We also must involve individual citizens in the planning to assure that the 5-year program will meet the conservation needs of individual land users as well as the Nation.

Districts can encourage public input by conducting open meetings to explain the upcoming resource appraisal, to discuss conservation needs, and to solicit ideas we can use in developing policy and carrying out our mutual work.

USDA also will be continuously evaluating progress and effectiveness of our programs and reporting yearly to Congress. The suggestions of State and local groups and other interested people will be not only welcome but vital to our responsiveness.

Through one of the most effective partnerships in history, SCS, districts and State conservation agencies, and private landowners have helped place soil and water conservation practices on millions of acres. Public Law 95–192 recognizes the strength of that partnership and is aimed at making it still more effective in the years ahead.

Mel Davis

February 1978, Vol. 43, No. 7

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of the Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget through July 31, 1978.

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Secretary of Agriculture

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Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Cover:
In areas of rugged terrain in Utah, soil surveys are made using helicopters. An article about using helicopters for soil surveys in Montana and Alaska, as well as Utah, begins on page 10.

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by Sharon Bell

A grassland area in California, once in danger of drying up, is now being managed for wildlife.

Planning Habitat for Wildlife

The soil is too poor and the rainfall too low for farming, but an area referred to as "the grassland" in Merced County, southeast of San Francisco, Calif., is one of the major wintering grounds for waterfowl along the Pacific Flyway.

The area covers 100,000 acres, most of it private land maintained for waterfowl. It attracts several hundred bird species, including ducks and geese, each winter.

About 10,000 acres of private land are managed according to long-term Water Bank Program agreements with the U.S. Department of Agriculture. Under the agreements, farmers and ranchers preserve and improve their wetlands as nesting and breeding areas for waterfowl. The Soil Conservation Service provides technical assistance for the cost-shared improvements, which are incorporated in conservation plans. Some 3,000 pairs of ducks—cinnamon teal, gadwell, and mallards—nest and raise broods on water bank land in Merced County.

State wildlife areas or national wildlife refuges cover 20,000 acres, and additional land is maintained for waterfowl by duck clubs.

Troubles for the area began in the 1920's, according to Jerry Cawthorn, manager of the Los Banos Wildlife Area in Merced County for the California Department of Fish and Game. With the building of dams in the Sierras about 50 years ago, much of the water that flooded the waterfowl area each year was diverted to other uses, such as irrigation, power production, and municipal use. Many wetlands dried up late in spring, depriving ducks and other birds of a place to nest and raise their young. In addition, the droughty, saline-alkali soils produced few food and cover plants for upland game animals.

SCS provided detailed information on managing the poor soils for wildlife habitat and designed water distribution systems. The SCS plant materials center at Lockeford, Calif., supplied trees, shrubs, and seed for experimental planting. Of particular interest were plants capable of furnishing wildlife food and cover while competing successfully with other species.

"We didn't have time or money to nurse plants along," said Cawthorn. "New plants had to make it on their own."

SCS also redesigned a drainage system for a parking lot and check station offices at the 3,200-acre Los Banos Wildlife Area. The paved area is drained by gravity rather than by pumps, and the runoff is diverted into the wetlands. The drainage system design saved the California Department of Fish and Game $150,000, which was used for other waterfowl improvements.

The Los Banos Wildlife Area was purchased in 1929 to provide habitat for waterfowl. It is one of three State wildlife areas in the county.

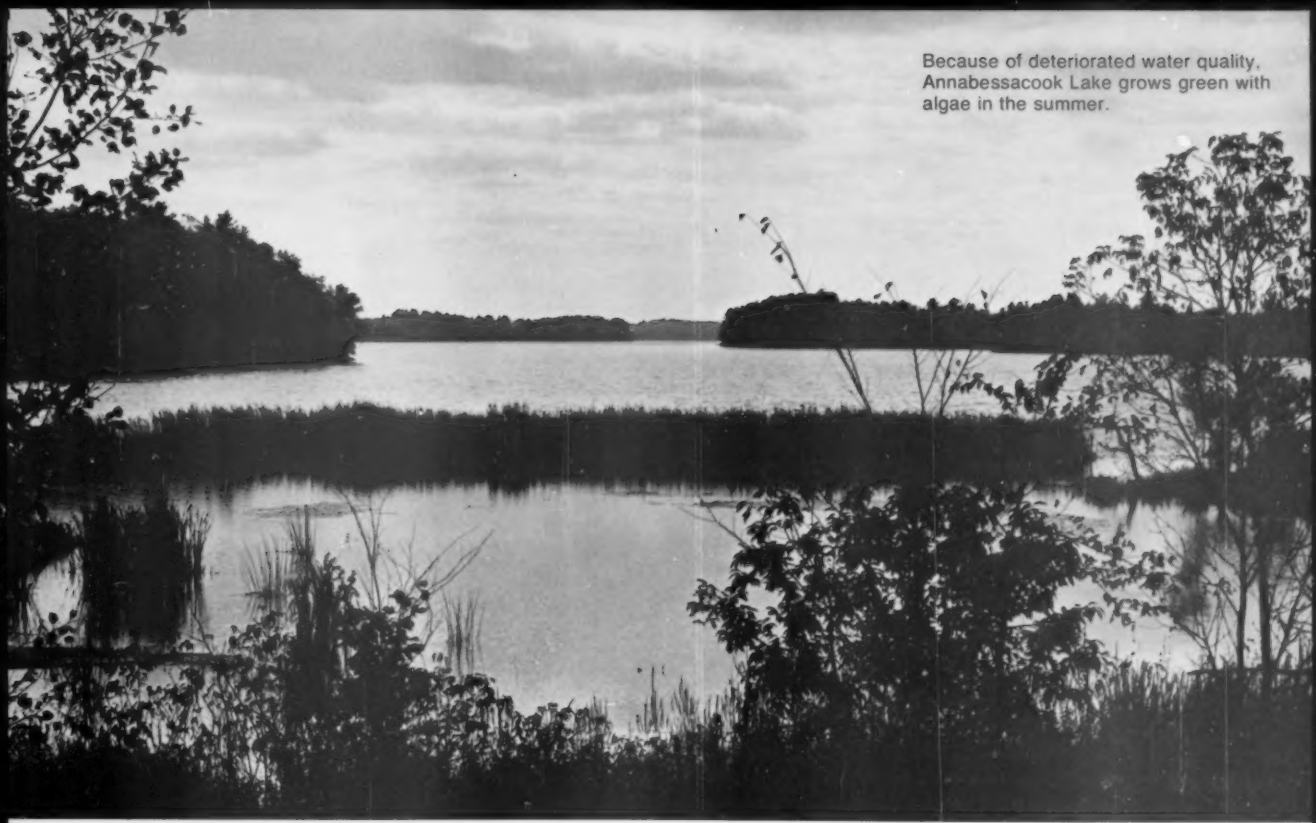
"We now have more than 200 species of birds, including 30 species of waterfowl," Cawthorn said. "Mammals here include coyote, gray fox, beaver, mink, badger, and weasel.

"This is what makes our job worthwhile," he added, "to take a poor piece of ground like this, that won't support anything but saltgrass and iodine bush, and create quality habitat for wildlife."

The management techniques and plantings that prove successful at the refuges are shared with other conservation district cooperators. Each year, Cawthorn conducts a tour of the wildlife area for SCS personnel and district cooperators. He instructs participants in marsh plant and animal species identification and discusses wetland management.

Four resource conservation districts (RCD) serve the area: Grasslands RCD, Gustine-Romero RCD, San Luis RCD, and Los Banos RCD. The Grasslands RCD has a staff biologist to advise cooperators on water distribution systems and on how to manage their land for waterfowl.

Ms. Bell is a public information specialist, SCS, Davis, Calif.



Because of deteriorated water quality, Annabessacook Lake grows green with algae in the summer.

Residential waste was suspected of polluting three lakes. But a Federal grant helped finance the search for the real cause and begin efforts to improve water quality.

by Judith E. Ladd

Maine Lakes Get Double Treatment

As in a typical detective novel, the first suspect was not the culprit.

In 1975, Cobbossee Watershed District (CWD) employees set out to find the reasons for deteriorated water quality throughout the watershed surrounding Winthrop, Maine.

"The area is not primarily agricultural, so residential waste was suspected to be the pollution source at the time we began our studies," said Tom Gordon, CWD executive director.

The effort began with formation of the special watershed district by the State Legislature in 1971. Legislators were particularly concerned about declining water quality in Cobbossee Lake, Annabessacook Lake, and Pleasant Pond. The three lakes are used for recreation and as a water supply for nearby towns.

Until a sewer line was completed in the Winthrop area in 1972, large quantities of phosphorus entered Annabessacook and Cobbossee Lakes in municipal sewage and industrial waste. Although the discharges were

Below, various kinds of manure storage facilities will be built on farms in the lakes area. At right, Clement Smith (center) discusses plans for a manure storage facility on his dairy farm with Kathy Sage, CWD agricultural coordinator, and Tyler Libby, SCS district conservationist.

diverted to the Augusta sewage treatment facility, the lakes still suffered from severe nuisance algae blooms.

In 1975, the Environmental Protection Agency (EPA) awarded a grant to the Southern Kennebec Valley Regional Planning Commission under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92–500). The Planning Commission contracted with the Watershed District to monitor water quality and to analyze nonpoint source pollution and private sewage disposal. During the study, the Watershed District determined that the lakes were suffering from phosphorus overenrichment, which caused the water to turn green with algae.

Although many of the thousands of camps on the lakes have septic systems they were found not to be responsible for the continuing problems.

"We started out suspecting that more regulation of lakeside camps, cottages, and homes would be needed—but that just wasn't the case," said Gordon. District studies showed that after the removal of industrial and municipal point sources, agricultural runoff from the area's dairy and poultry farms became the leading source of phosphorus in the lakes, he said.

In 1977, EPA awarded a 2-year, $278,000 grant for 50-percent funding of the Watershed District's Lakes Restoration Project. The Watershed District, the Maine Department of Environmental Protection, the Annabessacook Lake Improvement Association, the Agricultural Stabilization and Conservation Service (ASCS), and the Kennebec County Soil and Water Conservation District (SWCD) will share the rest of the project cost with participating farmers.

One objective of the project is the installation of manure storage facilities and other runoff control measures on dairy and poultry farms. Because of the high cost of building winter manure storage facilities (from $5,000 to $36,000 each), most farmers have not been able to afford them.

With the help of funds from the EPA grant and cost-sharing assistance from ASCS, farmers will be able to build the needed waste control measures. ASCS also will administer the grant money that is earmarked for agricultural work.

Without storage facilities, farmers pile or spread manure on frozen fields. During spring runoff, much of the manure is carried into streams which eventually empty into the lakes.

About 40 farmers have agreed to cooperate with the Kennebec County SWCD in this part of the project. The farmers will receive technical help from the Soil Conservation Service in developing conservation plans that incorporate effective storage facilities. The plans also will include information on rates and timing of manure applications to fields, on locations where manure can be applied at a safe distance from bodies of water (based on soils information), and on livestock exclusion.

"Construction will begin in spring, with the most critical problem areas

Wendy King and Dave Dominie of the Cobbossee Watershed District test visibility (above left) and take readings of dissolved oxygen and temperature (above) on Annabessacook Lake.

handled first," explained Tyler Libby, SCS district conservationist in Augusta. The facilities will provide 180-day storage, allowing farmers to apply the manure to hayfields and cropland when there is less chance of runoff.

"Studies of a similar project in New York showed a 50 to 75 percent reduction of phosphorus in streams after manure storage facilities were installed," said Kathy Sage, CWD agricultural coordinator for the project. "We're looking for at least that amount of control."

Another objective of the Lakes Restoration Project is treatment of 1,420-acre Annabessacook Lake, the second-largest of the three lakes, with alum.

Phosphorus which has accumulated in lake bottom sediments is being recycled back into the water, causing continued algae blooms. The alum treatment is designed to stop this internal recycling of phosphorus by precipitating the phosphorus to the bottom of the lake and holding it there.

Assisted by the Maine Department of Environmental Protection, the Watershed District is conducting laboratory and inlake tests to determine if the alum treatment will be effective.

"The alum treatment phase of the project is still in the research stages to determine if it is feasible and to make sure it won't have any detrimental effects on the lake," said Kathy Sage. "The treatment has been used successfully on smaller lakes but never on one as large as Annabessacook."

Careful planning and cooperation from landowners, according to Tom Gordon, will help the Cobbossee Watershed District achieve its goal: To restore water quality to the lakes and to establish sound land use practices to keep them clean.

Ms. Ladd is editor, *Soil Conservation*, SCS, Washington, D.C.

At left, Conservation Teacher of the Year James David and biology students evaluate pond microbiology at the outdoor study center. Below, Robert Brooks of Spartanburg, S.C., is the second-place winner.

Conservation Education Is a Winner

Outstanding teachers and conservation districts are rewarded for their work in helping young people understand more about conservation of our natural resources.

Every year the National Association of Conservation Districts (NACD) and Allis-Chalmers Corporation sponsor an Environmental Conservation Education Awards Program. The purpose of the program is to give national recognition to teachers and conservation districts for outstanding environmental education activities and to encourage more effective use of education programs to increase public understanding of conservation problems and environmental issues.

The 1977 Conservation Teacher of the Year is James R. David of Flagstaff, Ariz., and the winning district is the Gaston Soil and Water Conservation District (SWCD), Dallas, N.C. Each won a $1,500 prize for first place and an expense-paid trip to the NACD national meeting in February 1978, for the awards presentation.

David's prize-winning entry, nominated by Coconino Natural Resource Conservation District (RCD), was developed by Flagstaff Junior High School students who established an outdoor learning center on a drainage area formerly used as a trash dump. (See "Outdoor Study Center Rises from Mudflat," October 1977 *Soil Conservation*.) David, head of the biology department, and his students also won a Bicentennial Youth Program award for the learning area.

At left, Gaston Soil and Water Conservation District, Dallas, N.C., is the first-place winner in the district category with a program that included helping 18 schools with outdoor classrooms. Below, Pulaski Conservation District, Little Rock, Ark., won second place. Students participated in many conservation projects including tree planting.

which includes a study trail and wildlife habitat improvement.

Gaston SWCD, under the leadership of Chairman R. Wilson Barnett, won first place among districts with a broad-based program that included help with outdoor classrooms for 18 schools, teachers' workshops, and assistance to a variety of youth groups. Through the Comprehensive Employment and Training Act, the district hired a full-time environmental education coordinator, Melissa Jones, who worked with schools and prepared a booklet on using outdoor classrooms. She also developed an activities guide in environmental studies for teachers in grades 3 through 6.

Second place awards of $300 each were won by Robert A. Brooks, Jr., Spartanburg, S.C., in the teacher category, and Pulaski Conservation District (CD), Little Rock, Ark., in district competition.

Brooks, the science teacher at Campobello-Gramlin Junior High School, along with other faculty members and students, developed a 3-mile learning trail on the school site. It is used by groups of teachers attending certification workshops conducted by Brooks. Specially trained student leaders serve as guides and instructors for environmental studies on the trail. Brooks has prepared a teaching guidebook for the trail which includes plant identification and soil maps of the area prepared with the help of the Soil Conservation Service. His entry was sponsored by Spartanburg CD.

Pulaski CD placed second with a program under the leadership of Chairwoman Mary L. Ratcliffe that has involved most of the community. A radio and TV conservation campaign netted more than 200 hours of public service time. Total commercial dollar value of the donated time was estimated at almost $120,000. Pulaski CD also sponsored a Junior Board of 65 members who last year constructed a greenhouse at Jacksonville High School, staffed a State fair booth, sponsored a poster contest, and helped with several tree planting projects.

In addition to the national cash awards, each winner in the NACD regional judging received a $200 prize.

Southeastern region won two national awards: Robert Brooks, Spartanburg, S.C., second place in the teacher category, and Gaston SWCD, Dallas, N.C., first place in the district category. Southwestern region was represented in the top winners by James R. David, Flagstaff, Ariz. South Central region's Pulaski CD, Little Rock, Ark., was in second place in the district category.

Other regional district winners included: Northeastern region, Lebanon County CD, Lebanon, Pa., George B. Wolff, chairman; Upper Mississippi region, Green County SWCD, Monroe, Wis., William F. Reimer, chairman; Northern Plains region, Ellis County CD, Hays, Kans., Wesley Bittell, chairman; Southwestern region, North Cache and Blacksmith Fork CD, Logan, Utah, with Valden Pitcher, chairman of North Cache and Jay Bankhead, chairman of Blacksmith Fork; Pacific region, Clatsop SWCD, Astoria, Oreg., Howard B. Johnson, chairman.

Regional Conservation Teacher of the Year winners included: Northeastern region, Gerald Beals, Plymouth CD, Brockton, Mass.; Upper Mississippi region, Roger Zulauf, Morgan County CD, Jackson, Ill.; Northern Plains region, Connee Quinn, Todd County CD, Mission, S. Dak.; South Central region, Cheryl Hollingshead, Garland County CD, Pearcy, Ark.; Pacific region, Gerald Stoops, Redlands-Highland-Yucaipa RCD, San Bernardino, Calif.

Amphibious planes, as well as helicopters, are used to survey Alaskan soils.

Soil Surveys Take to the Air

Soil scientists are taking to the air to speed information to land users, to dig their augers into previously inaccessible soils, and to map vast expanses of untamed land.

by Anne Schuhart

Today, when information about the Nation's soil and water resources is in more demand than ever, soil scientists are finding the helicopter to be as valuable a tool as the shovel. Teams of the scientists flying over a survey area can distinguish and map soil boundaries by using background information and by touching down periodically to sample the soil for "ground truth."

Aerial mapping provides ample soils information for planning grazing and other low intensity land uses. Detailed soil surveys, which require soil scientists to walk over the land and map acre by acre, are designed for cropland, urban development, and other more intensive land-use planning.

Western States, with many areas of native rangeland, lead the Nation in using helicopters for mapping soils.

Montana

Using a helicopter, four Soil Conservation Service soil scientists mapped 600,000 acres in Phillips and Garfield Counties, Mont., in less than 15 days.

The Bureau of Land Management (BLM), U.S. Department of the Interior, requested the soils information to use in writing management plans and environmental impact statements. BLM is charged with preparing environmental impact statements by the end of 1978 for land it administers. Until the statements are completed and approved, no improvements, such as crossfencing or stockwater ponds, can be made.

BLM lacked soil surveys for most of the land it administers in Montana. "This was one of the big gaps," said Mike Rollins, BLM soil scientist at Billings. "We had no information for Garfield and Phillips Counties."

BLM soil scientists are not involved in the actual mapping of soils. "We mainly apply the soils information in land-use planning," Rollins explained.

"If we had to do the mapping here, it would take us 3 to 4 years to acquire the skill needed to complete the soil survey so quickly. It takes a team of experts to do anything like this in such a short time," he added.

SCS was prepared for the job, said Jack Rogers, SCS State soil scientist. "We had already completed detailed soil surveys of land adjacent to most of the area, and the climate and parent material are quite uniform. We could accurately predict the kinds of soils and map them."

The actual mapping took only 14½ days, as compared to about 7 months

In Utah, soil scientists ink in predicted soil boundaries on aerial photographs before field work begins.

Gerald Simonson (left), professor of plant and soil science at Oregon State University, works with Sam Short, SCS range conservationist in Montana, and Robert Richardson (right), SCS soil scientist in Montana, in identifying range plants and describing soil type.

Robert Richardson, SCS soil scientist in Montana, uses a hand lens to study a soil's mineralogy—a factor used to determine soil type.

it would take one person to walk the land. But much preparation was made before the helicopter took off.

BLM supplied aerial photographs of the area and marked section corners and ownership boundaries. The SCS soil scientists then delineated major landscape features on the maps.

Using completed surveys for areas around the two counties and drawing on their knowledge of the soils, climate, vegetation, and landscape features, the SCS soil scientists prepared descriptions of the soils they expected to find. Without all the background data, even flying around in a helicopter wouldn't do the job, they agreed.

Once in the air, the soil scientists had the helicopter touch down often so that they could examine the soils to confirm their predictions. "Where the soils were different from what we expected, we modified or expanded the descriptions," Rogers said.

Sam Short, SCS area range conservationist at Lewistown, worked with the soil scientists in identifying the existing and potential vegetation for each of the soils.

"BLM needs the soil survey for planning the best management of rangeland. A properly designed, low

Utah photos, Fred Wright, Salt Lake City, Utah.

At left, helicopter shuttles Utah survey crew from Sixshooter Peak region to the road head at day's end. Below, Mark Beroz, SCS soil scientist, directs helicopter pilot to investigation site in Utah using aerial photographs.

intensity soil survey provides enough soils data to help achieve that objective," said Rogers.

Utah

A helicopter proved to be the only practical means of access to more than a million acres of rugged canyonlands in eastern Utah.

BLM requested a soil survey of the Canyonlands Area, a section of the Colorado Plateau between the Colorado River and the Utah-Colorado State line. This section of the plateau ranges in elevation generally from 5,000 to 7,000 feet and is dissected by numerous canyons that drain into the Colorado River. Its mesas, benches, and valley floors are separated by very steep escarpments.

Much of the rough terrain limits travel to four-wheel-drive vehicles. Many isolated mesa tops defy all surface vehicles and can be reached only by using rock-climbing gear or by helicopter. Some of these are very important as "relict areas" for studying soil and plant relationships, because they have not been disturbed by livestock or wildlife.

After nearly a year of mapping the more accessible parts of the area, three field teams assembled early last summer to begin mapping from a helicopter. Each team consisted of a soil scientist from the local survey party, a soil scientist from the SCS State office at Salt Lake City, and a range conservationist.

The soil scientists selected sample sites and directed the flights. They also inked in the soil boundaries on high-elevation, quad-centered aerial photographs.

The range conservationists identified plants and determined the condition and potential of the native range. With this information, the soil scientists could compare similar soils in different locations because each soil has a potential plant community with a certain composition and production.

The three teams worked on adjacent maps. The helicopter flew almost continuously, setting down one team to sample the soil, picking up and moving the second and third teams, then going back to move the first team again, allowing each team about 30 minutes on the ground to describe the soils and vegetation.

At lunchtime, the teams gathered at a central location to coordinate and discuss the morning's work while the helicopter carried soil samples back to a spot selected for refueling.

Much of the Canyonlands Area is ideal for aerial mapping, because landform boundaries are sharp, vegetation is sparse, and rock outcrops can be easily identified. Most soil boundaries could be quickly located and mapping unit composition readily estimated from the air.

The helicopter provided another advantage. Together, soil scientists and range conservationists could observe broad landscapes and vegetation patterns and get an overall view of the relationships on the ground. The teamwork among the soil scientists and range conservationists helped tailor the survey to BLM's need for basic data to use in managing the area for livestock and wildlife.

Alaska

Using helicopters to map nearly 363 million acres of largely unsettled land in the Nation's northernmost State was not an alternative—the enormity of the job made choppers and light support planes a necessity.

The exploratory soil survey of Alaska, to be published in summer 1978, was initiated by SCS to provide

Below, soil surveyors take samples for ground truth on the lichen-covered Alaskan tundra. At right, a tract cleared of timber and brush was planted to barley in the Delta Junction area of Alaska.

information to State and Federal agencies that needed basic resource data.

"We set out to classify the soils in Alaska on a broad scale," said Clarence Furbush, SCS soil scientist at Palmer. "We really had only a general idea of the kinds of soils we had here. The survey identified potential agricultural land we didn't know we had as well as the forest and tundra soils."

Only one soil scientist at a time and the helicopter pilot were engaged in the SCS exploratory soil survey. "We carried a tent and supplies with us, and we had gas cached in bushes all around the State. We would land where the gas was cached, camp and work in the area, then go to the next cache," Furbush said.

Although the soil scientist could scrutinize mile after mile of roadless wilderness from the helicopter in a single day, it took eight summers, from 1967 to 1975, to map the land of the midnight sun.

State agencies, BLM, and various consulting firms already have used soils information gathered in the exploratory soil survey in selecting land and in evaluating proposals for land use.

"Even though the survey isn't published yet, hardly a week goes by without someone requesting soils information that we could not have provided before the survey," said Furbush.

"Now even our more detailed, medium intensity soil surveys of specific areas are being made with the help of helicopters. For example, last summer we surveyed the unpopulated Totchaket area primarily to determine agricultural potential. In another area near Delta Junction where we identified potential agricultural land, the State plans to clear 2,000 acres and turn it over to people interested in farming," said Furbush.

"Other surveys are for a more specific purpose. For instance, an SCS soil scientist and a range conservationist made a low intensity soil survey near Kotzebue to determine the carrying capacity of the native vegetation for reindeer.

"When we make a medium intensity survey, the helicopter drops us off in the morning and then takes us back to a central camp in the evening. Sometimes the crew is moved several times a day, depending on the soil pattern," he explained. "The survey crew includes a party leader, three or four soil scientists, and field aides who carry guns."

Guns?

"Sure," Furbush grinned. "We've had some pretty hair-raising experiences.

"Just last summer, three of us soil scientists were out on an initial review of the area when a brown bear charged out of the brush right for us. I pulled the trigger, but the gun was still on safety. The bear was within a few strides so I jumped and shouted and stared him down. The bear came to an abrupt stop. Nose in the air and teeth showing, he hesitated, then turned and ran into the bushes."

In spite of Alaska's testy bears, SCS soil scientists managed to map more than 360,000 acres in summer of 1977. "Next summer, two parties using two helicopters are aiming to map a million acres of wilderness in detail," Furbush said.

"Flying in choppers can be hazardous if safety precautions are not strictly observed, but with a skilled pilot familiar with the terrain and a machine in top mechanical condition, the risks are not great," explained Furbush. "The worst experience we

Choppers transport soil survey teams, food, and equipment to remote base camps.

Channel changes of a typical Alaskan river create a pastoral impression in the wilderness. Soil surveys indicate that the timbered areas are potential agricultural land.

have had was when a chopper could not be started after landing because of a dead battery, and the soil scientist and pilot had to walk 30 miles to where they could be picked up by a light plane.

"We've also used riverboats and large-tracked vehicles. But the boats are limited to waterways, of course, and the cross-country vehicles are expensive, they can damage the tundra, and they break down often.

"Our season here is so short that when we can work, we take advantage of the long days. And when we have 10 soil scientists ready to map, we can't afford a breakdown."

Ms. Schuhart is a writer-editor, Information Division, SCS, Washington, D.C.
Contributing authors: Brad Anseth, public information officer, SCS, Bozeman, Mont.; and Duane Lammers, soil survey party leader, SCS, Moab, Utah.

The terminus of the Harding ice field on the Kenai peninsula of southern Alaska is a typical Alaskan glacier and shows the ruggedness of some of Alaska's 363 million acres.

Sand and silt erode from borrow area into streams and rivers, polluting New York's water resources.

Second Chance for Mined-Out Land

by Harry W. Oneth

Before 1975, sand and gravel mining in New York was good for the economy but often bad for the landscape. Now, a reclamation law gives many "mined-out" areas a new lease on life.

A multimillion dollar industry that creates thousands of jobs, a product sought by business and consumers, and production sites close to major roads and people add up to a prosperous industry and a healthy economy.

They can also add up to environmental problems—lower water quality and loss of valuable topsoil.

Mining for minerals is a major industry in New York State, and sand and gravel mining makes up a large part of the State's total income from mining.

That was the dilemma facing State legislators in 1974, when they began studying the mineral industry.

Runoff from sand and gravel mines was polluting the State's water resources: Sediment was clogging streams, filling in deep pools, and discoloring the water. Sedimentation was increasing the threat of flooding by lowering stream capacity, and it was decreasing trout populations by destroying spawning sites. Sites that held water were becoming breeding grounds for mosquitoes. Active mines were dusty, noisy, and dangerous.

A well-established stand of flatpea planted on the bank of an abandoned gravel pit provides erosion protection, beautification, and wildlife cover.

Most mines are in plain sight of main roads and residential areas, compounding the environmental problems.

Legislators tried to find a balance between what was sound for the economy and good for the environment. They passed the New York State Mined Land Reclamation Law, which went into effect on April 1, 1975. The law made conservation and reclamation integral parts of mining. It was designed to promote mining practices compatible with conservation practices and to restore lands already mined.

The law requires owners of mines producing more than 1,000 tons of material annually to register with the Bureau of Mineral Resources of the New York State Department of Environmental Conservation. Within the first 18 months, more than 1,000 mines were registered.

The Soil Conservation Service and the New York soil and water conservation districts help landowners comply with the law by providing technical assistance in planning and applying conservation measures to mined areas. How the land is to be used after mining must be determined early in the planning stage so that the mining operation can support the after-mining use of the land.

Soil survey data is essential in planning post-mining uses. It helps avoid offsite damage and helps in selecting plants to revegetate mined areas.

Most sand and gravel mining sites are close to urban centers, making them good locations for housing developments. Where housing developments are planned, surrounding natural areas are disturbed as little as possible and topsoil is stockpiled during mining and protected so it can later be regraded over the mined area to support lawns and gardens. Conservation practices also include diversions, sediment basins, ponds, and tree plantings.

Mining sites can be adapted for growing trees with a minimum of land grading, and water recreation areas can frequently be included in mined land reclamation plans.

Natural waterways and existing vegetation are used wherever possible to divert upstream water away from the mining site, helping contain site-produced waste within the mining area. Most operations use diversions, sediment traps, and basins for controlling erosion.

Wooded areas surrounding mining sites are left undisturbed and more trees are planted where they are needed to control dust and noise.

At most sand and gravel mines, trees are planted or temporary fences put up to screen them from view. Sometimes fast-growing trees are planted for immediate cover and more durable species planted where they will be needed for a long time.

The State's Department of Environmental Conservation, SCS, and the conservation districts are cooperating to make the new mined land reclamation law workable and effective. They're helping maintain a healthy economy and a healthy environment for New York.

Mr. Oneth was State resource conservationist, SCS, Syracuse, N.Y. He is now an assistant State conservationist, SCS, Huron, S. Dak.

Terracing, one of the most successful conservation practices in Missouri, is getting support from plastic tubing.

by Donald L. Diehl

Plastic Tubing Goes Underground

Wayne McReynolds (left), SCS district conservationist, and Hunter Stallings examine a riser similar to the ones connected to plastic tubing installed in a terrace on Stallings' farm.

In Saline County, Mo., where the practice of terracing is more than 50 years old, the use of corrugated plastic tubing—which is less than 10 years old—is allowing many farmers to combine an old system and a new material, usually ending up with more land to farm.

Farmers who have been using terraces to curb soil erosion have found that now they can get even more productivity by installing the new subsurface outlets, commonly referred to as tile outlets. Productivity is increased because the area formerly in grassed waterways can be farmed and the subsurface outlets with terraces provide better drainage. Farmers who have not been sold on terraces in the past are now considering the system.

Installing the new plastic tubing is not cheaper than clay or concrete drain tile. It costs about $100 to $150 per acre to build the terraces and install the lines.

Continuous plastic tubing provides a good solution for underground outlets especially when terraces are built on steep slopes. Terraces in the past were built to drain onto grassed waterways that carried surface water from the field. Now the new plastic tubing system, with its "risers," carries the excess stormwater underground and reduces the need for grassed waterways.

Saline County is one of the top corn-producing areas in Missouri. But a large percentage of the land is rolling and susceptible to erosion. Terracing and contouring are the two most successful conservation practices in combating soil erosion.

Farmers like Martin Kiehl and Hunter Stallings, who both operate large farms west of Marshall, agree that the primary thing wrong with the new plastic tubing and riser system is that it wasn't developed years ago.

In 1973, Kiehl converted several acres of terraced land to the new system and reclaimed several acres of land tied up in grassed waterways. Land value is one reason farmers are considering the new system, he pointed out. In addition, he said he now has more control over the water in the field and the soil is easier to work.

Stallings agrees. He has worked with the Saline County Soil and Water Conservation District (SWCD) and Soil Conservation Service engineers to develop

a design for installing several acres of new terraces and replacing tile in other areas.

Most of Stallings' 415 acres are terraced. "The new system already has proved profitable and will be more so in the future," he said.

Both Stallings and Kiehl said people just can't continue to plow up and down the hills. And Stallings says that farmers who allow their topsoil to erode "are just stealing from us all."

But not all Saline County farmers are as enthusiastic as Stallings and Kiehl. Wayne McReynolds, SCS district conservationist for Saline County, is concerned about soil erosion. He provided help to many local farmers in installing about 100 miles of terraces in 1976. "But that's not enough," he said. "Soil continues to erode and we should be doing more."

McReynolds says that farmers usually come to the district office if they're interested in terraces or the new underground outlet system. "But we can't force the issue," he said.

A lot of States now have legislation to enforce the control of sediment, and McReynolds feels such a law may be passed in Missouri eventually. Meanwhile, he relies on farmers to tell their neighbors about the advantages of terraces and contour farming.

Working closely with McReynolds' office is the Saline County Agricultural Stabilization and Conservation Service (ASCS) Committee which provides financial help to farmers who install conservation measures.

The ASCS Committee along with the SWCD board and the Saline County Cooperative Extension Service meet each year with interested people to discuss the conservation needs of the county.

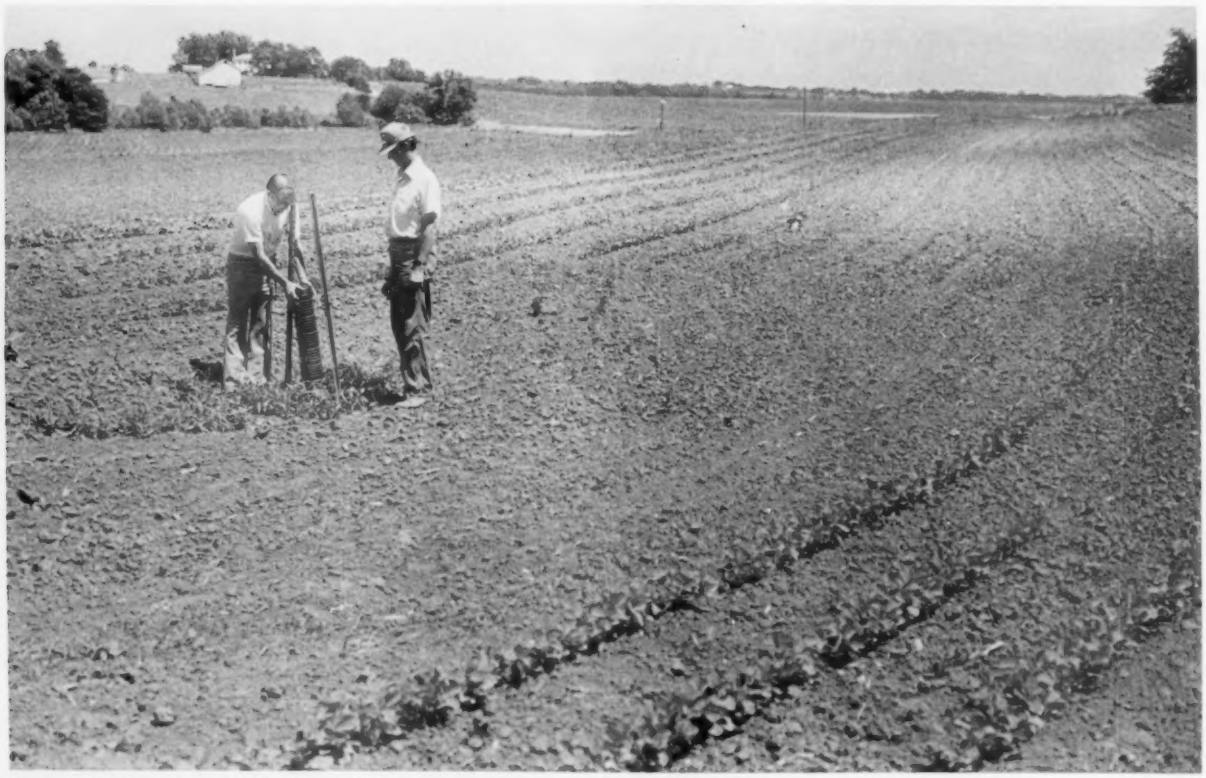
In 1977, the Federal Government allocated $128,000 to be used for conservation practices in Saline County. It is the ASCS Committee's function to distribute these funds in areas where they are most needed.

"With the increased emphasis on food and fiber production, we feel it is in the public interest to promote soil conservation," said Robert M. Edwards, ASCS Committee chairman.

But it's no giveaway program. A farmer still has to come up with 50 percent of the cost. And there's a limit of $2,500 that an individual farmer can receive. Nevertheless, it is estimated that conservation-minded Saline County farmers have invested a half million dollars in soil conservation practices in recent times.

Mr. Diehl is farm editor, *Democrat News*, Marshall, Mo.

Adapted from an article in the *Democrat-News* that won the 1977 CIBA-GEIGY Agricultural Recognition Award for outstanding journalism.



Newly built terraces on the Martin Kiehl farm use slotted plastic tubing instead of conventional clay tile to control soil saturation. Inspecting one of the risers, through which stormwater enters the systems, are Wayne McReynolds (left), SCS district conservationist, and Kiehl.

by George T. Keller

Prescribed burning restores prairies to native vegetation, which helps to control erosion and improves wildlife habitat.

Restoring Native Prairie Vegetation

Undisturbed areas of native prairie vegetation are rare today, but efforts are being made to restore native vegetation where it was once abundant.

The restoration of even small areas of prairie can help control erosion. According to C. M. Schumacher, Soil Conservation Service range specialist in Huron, S. Dak., plants foreign to the prairie expose the land to greater destruction by the elements than native plants. Also, native prairie grasses are attractive to some wildlife species as nesting cover, according to a study by the Iowa Conservation Commission in the mid-1970's.

One inexpensive method of prairie restoration is prescribed burning, also called spring fire management. When this practice is used, conditions for burning—such as soil moisture, wind velocity, and humidity—must be favorable.

A prairie restoration project using prescribed burning was undertaken in the unused part of the Munson Township cemetery near Cambridge, Ill. The Henry County Historical Society and the township board approved the restoration as a Bicentennial project.

During the 1930's, the 4-acre plot had been plowed, seeded to legumes, and sodded with Kentucky bluegrass (Poa pratensis). Indiangrass (Sorghastrum nutans), a native prairie plant, grew sparsely in the area.

In 1970, routine mowing of the plot was stopped and in spring 1971, as the bluegrass began to turn green, prescribed burning suppressed it.

By fall 1971, Indiangrass grew shoulder high in the plot and other native plants such as little bluestem (Andropogon scoparius) and tick trefoil (Desmodium illinoense) began to come back.

Prescribed burning was repeated each spring for several years with continued success. After the second year, prairie forbs were more numerous. By the third year, butterfly weed (Asclepias tuberosa) appeared and compassplant (Silphium laciniatum) and rattlesnake master (Eryngium yucci-folium) increased in number. After 4 years, the extremely rare white-fringed orchid (Habenaria leucophaea) appeared in the plant community.

Botanist Robert Betz of Northeastern Illinois University, who participated in the project, found more than 50 native plants in the area in 1975.

The proportion and character of the various plants changed from year to year. By 1976, indiangrass was no longer as dominant and was much shorter. The once dominant bluegrass was greatly reduced except around the cemetery entrance.

Some unwelcome plants, such as the wild parsnip (Pastinaca sativa), also appeared. The local grade school science club volunteered to remove them by handweeding. The students had to wear long sleeves and gloves to guard against the uncomfortable skin rash caused by the wild parsnip's sap when exposed to sunlight.

The restored prairie proved to be educational. Visitors to the area during the Bicentennial year observed a diverse array of grasses and prairie flowers on land much like it was when the early settlers found it.

The experience gained in the project was later applied successfully to areas such as roadsides, railroad rights-of-way, and pastures no longer used for grazing.

Prescribed burning was also applied in fenced areas on a pasture with droughty soils that were originally scheduled for renovation by plowing and reseeding. Native grasses appeared the following year but on a limited scale. More time is required on some soils for the native plants to reestablish themselves.

The least disturbed areas offer the best opportunities for prairie restoration. Selecting the best sites for restoration requires experience with and understanding of local plant and soil relationships.

Mr. Keller is a former soil scientist, SCS, Sterling, Ill.

by Clifford E. Jones

Using their conservation plan, residents of a Massachusetts town established a 3-mile bicycle trail.

A Bike Ride into the Past

The townspeople of Easton, Mass., built a very special bicycle path to mark the Nation's 200th anniversary—and the town's 250th.

"We in Easton are proud that we could bridge our present to our past with this bicycle path and, at the same time, build something for the future," said Robert Shephard, chairman of the town's Dual Bicentennial Celebration Committee.

"I don't think we could have done it, though, without the Soil Conservation Service and its close understanding of the land."

In fall 1974, SCS helped design and lay out the trail and develop a conservation plan for the area.

Town groups and organizations pitched in to help with the project. For example, the ecology class at Oliver Ames High School spent many days clearing brush to prepare the site for construction.

Dedicated in June 1975, the town's anniversary, the path leads cyclists, joggers, and strollers past sites rich in social, political, and natural history.

The path begins near the Ferguson family cemetery, which dates back to 1740. It continues on to Meditation Rock, which was dedicated by the various religious faiths in Easton and is a quiet place for reflection. Nearby, carefully planted shrubs and trees give cyclists a look at different types of wildlife habitat.

Next, the path passes the foundation of a hoe shop owned by the Ames Shovel and Tool Company. Founded in 1773, Ames was the first company in America to produce shovels in any quantity.

Farther along is Militia Park, where the town militia trained during the Revolutionary War and where Minutemen and townspeople gathered to form the first company to serve under George Washington.

Beyond the park is Hog Head Spring, a natural spring bubbling up through clean white sand. The Ames company channeled spring water 1½ miles through a hand-dug, stone-lined ditch to their hoe shop. More than 150 years later, one of the town's first soil conservationists, John Freitas, sunk a cider barrel around the spring to preserve its mouth.

The path follows streams, winds around ponds, and meanders through the town forest, a healthy stand of white pine that provides shady rest stops. It leads to Borderland State Park, where it connects with 2 miles of park trails to total 5 miles of continuous cycling.

"We wanted a hard surface on the path, but we didn't want asphalt because it would take away from the natural look of the area," said Shephard. Following an SCS suggestion, the path was built of gravel and topped with 6 inches of tightly compacted stone dust to form a natural looking, but firm, surface.

The path also serves the present. Cyclists can use it to reach the community swimming pool and little league ballfield from any part of town and, for the most part, avoid busy streets.

Mr. Jones is soil conservationist, SCS, Raynham, Mass.

by Malcolm McDonald

A soil and water conservation district board replaced its old roadside signs with new ones with the help of the Future Farmers of America.

New Signs for New Times

"People judge you by what they see of you," decided the board of directors of the Dugdemona Soil and Water Conservation District, in Winnfield, La.

That's why the board tore down all its worn and sagging district roadside signs and replaced them with shiny new ones.

"The way we figured," said Shelby Gaar, district chairman, "people driving through are either impressed or depressed when they see our boundary signs. Too often I see signs hanging by one corner, rusty and full of holes, as if the district had gone out of business. So we took a good look at our old signs and decided it was time to buy new ones."

Five metal signs were ordered from the service department of the National Association of Conservation Districts. Total cost: $210. Neighboring districts cooperated, so that boundary signs could also display their names on one side.

The rest of the work was done by the Calvin Chapter of the Future Farmers of America (FFA).

"We agree with the FFA motto of 'learning to do and doing to learn'," commented Gaar. "The young people did a first-rate job. Our only additional expense after buying the signs was a bucket of paint and a few bags of ready-mix concrete."

The FFA boys used the school shop to cut pipes and other metal for the signposts and frames. They also painted the posts, mixed the concrete, and erected the signs, with the whole chapter participating.

After the signs were up, the district board met with the young people at a school luncheon, where they also held a board meeting.

Both Gaar and Edward Chandler, who is adviser for the FFA chapter, felt that installing signs is an excellent way to keep young people involved in soil and water conservation activities.

"Pride in the district and in conservation work must be repeatedly demonstrated and practiced," said Gaar. "One good way to do this is to ask FFA and other youth groups to help keep roadside signs looking up-to-date. The young people get more interested in soil conservation, and passers-by get a favorable image of our program and our organization."

Mr. McDonald is district conservationist, SCS, Winnfield, La.

Boys from Louisiana's Calvin Chapter of the Future Farmers of America erect a new conservation district boundary sign.

Secretary Says New Law Will Strengthen Soil Conservation

According to Secretary of Agriculture Bob Bergland, a new law will enable the U.S. Department of Agriculture to begin immediately to strengthen its soil and water conservation programs.

Actions will include gathering more data to appraise the condition and quality of America's soil and water resources by 1979; setting a 5-year plan for USDA conservation assistance; and evaluating the effectiveness and progress of ongoing conservation programs.

These steps are called for in the Soil and Water Resources Conservation Act of 1977 (Public Law 95–192), signed by President Carter on November 18, 1977.

"The new law will help show the effectiveness of the 40-year partnership among the Soil Conservation Service, State and local agencies, conservation districts, and individual land users," Bergland said.

"Together these groups and the public will make informed, long-range policy decisions about the conservation and improvement of our Nation's soil, water, and related resources. They will help set national policy and priorities based on the appraisal; develop a 5-year conservation program to meet the long- and short-term needs of the Nation and individual land users; and continue to evaluate what is—or should be—accomplished in SCS programs."

The appraisal and program will be presented to Congress by the end of 1979, Bergland said. His first evaluation report will go to Congress at the end of fiscal year 1982.

Meetings:

February	
5–9	National Association of Conservation Districts, Anaheim, Calif.
5–10	Society for Range Management, San Antonio, Tex.
17–20	American Association of School Administrators, Atlanta, Ga.
19–22	National Association of Manufacturers, Washington, D.C.
21–22	Southern Forest Institute, Inc., Atlanta, Ga.
26–Mar. 1	Land Improvement Contractors of America, Las Vegas, Nev.
26–Mar. 3	American Society of Photogrammetry, Washington, D.C.
28–Mar. 3	American Camping Association, Anaheim, Calif.

March	
12–16	American Concrete Pipe Association, Atlanta, Ga.
17–19	National Wildlife Federation, Phoenix, Ariz.
19–22	North American Wildlife and Natural Resources, Phoenix, Ariz.
22–23	Air Pollution Control Association Government Affairs Seminar, Washington, D.C.

April	
4–6	Garden Club of America, Birmingham, Ala.
5–7	Engineering Geology and Soils Engineering Symposium, Boise, Idaho
9–11	American Pulpwood Association, Atlanta, Ga.
9–12	Association of American Geographers, New Orleans, La.
17–21	American Geophysical Union, Washington, D.C.
19–21	Hardwood Plywood Manufacturers Association, Panama City, Fla.
24–26	National Academy of Sciences, Washington, D.C.
29–May 4	American Society of Planning Officials, Indianapolis, Ind.
30–May 2	Chamber of Commerce of the United States, Washington, D.C.

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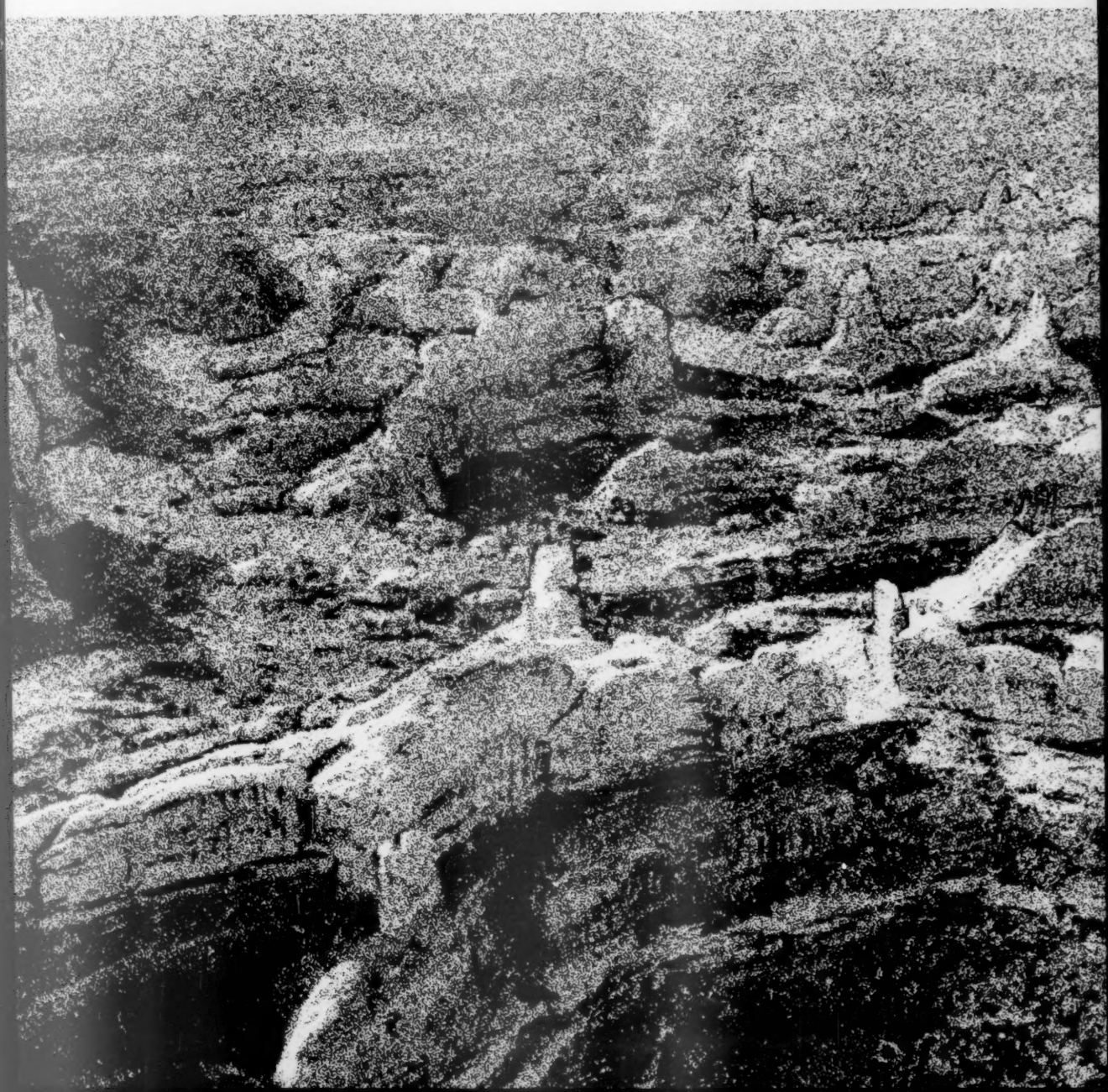
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